in the ground water tends to promote nitrification. He points out that by proper forest management the formation of nitrates may be accelerated and a decided increase in timber production obtained.

In a second article[24] he investigates the problems of the regeneration of conifer forests, with particular reference to the transformation of nitrogen, for it appears that while trees of pine and spruce often grow in forests where no nitrate formation is taking place, the raw humus developed beneath their dense shade does not prove a good soil for the rapid growth of their seedlings. It seems from experimental evidence that nitrogen transformation in such soils may be initiated and accelerated by the introduction of light through cutting, by burning the surface, or by stirring the surface soil. Decaying timber seems to favor nitrogen transformation, and this may tend to account for the observed abundance of conifer seedlings growing upon fallen logs.

In mixed conifer stands, especially where the herbaceous undergrowth is good, nitrate formation is, in contrast, rather active; so much so in many instances as to induce such a rank growth of herb and grass vegetation in clearings as to crowd out conifer seedlings. These and other data should help to explain to the ecologist many phenomena of secondary succession, while from the same data the forester should receive guidance for the formulation of a policy of forest management that will favor the formation of the amount of nitrogen best suited to the regeneration of the forest.

The value of these excellent papers is increased by an abundance of tabulated data, by being freely illustrated, and by extensive bibliographies.—GEO. D. FULLER.

Mechanics of movement in insectivorous plants.—Two recent papers on this subject, by BROWN[25] and by HOOKER,[26] have supplied some interesting information. Although different plants were used, the results are comparable in many respects. Both investigators find that the bending is accompanied by an extension of the cells on the convex side, which soon becomes fixed by growth; that there is little or no change of size in the cells of the concave side; and that unbending is accompanied by growth on the concave side. HOOKER finds the osmotic pressure of the cells on the convex side of bending tentacles less than that on the concave side, and this decrease is proportional to the increase in the length of the cells. He finds no changes in permeability and concludes that the increased size of the cells is due to decreased elasticity of the cell walls.

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[24] HESSELMAN, HENRIK, Om våra skogsföryngringsåtgärders inverkan på saltpeterbildningen i marken och dess betydelse för barrskogens föryngring (with abstract in English). Meddel. från Statens Skrogsforsöksanst. Haft 13–14. 923–1076. *pls. 15. figs. 48.* 1917.

[25] BROWN, WM. H., The mechanism of movement and the duration of the effect of stimulation in the leaves of *Dionaea.* Amer. Jour. Bot. **3**:68–90. 1916.

[26] HOOKER, HENRY D., JR., Mechanics of movement in *Drosera rotundifolia.* Bull. Torr. Bot. Club **44**:389–403. 1917.

BROWN reports no determinations of osmotic pressure, but finds that if closed leaves of *Dionaea* are killed, before the extension of the cells has become fixed, and passed through alcohol to xylene, the leaves reopen, and close again when passed back through alcohol to water. He concludes that the increase in size of the cells is due to increased osmotic pressure. He believes there is no permeability change, and thinks changes in the elasticity of the cell walls improbable. It is interesting if, in fact, the mechanics of these two responses, so similar in many respects, are so widely different in another.

Geotropic bending of growing organs is similar in many respects to the movements studied. Its comparative slowness should make it somewhat easier to follow, and the results might furnish valuable suggestions as to the mechanics of these more rapid movements. SMALL[27] has found differences in permeability in the two flanks of *Vicia Faba*, roots bending geotropically.—THOMAS G. PHILLIPS.

Soil moisture studies.—The extensive investigations of BRIGGS and SHANTZ have shown the importance of the moisture equivalent as a constant that will measure the physical properties of soils. Two recent studies deal with certain phases of the same phenomena. The first[28] shows that while the addition of various salts does not materially change the moisture equivalent of the soil under investigation, if the same salts are washed from the soil with water it then seems to possess a new and peculiar set of physical properties and its moisture equivalent is markedly increased. This increase varies from 2 to 40 per cent, and is taken to mean that the washing out of the salt has increased the interior surface of the soil.

The second article, by SMITH,[29] reports the investigation of the relationship between the results of mechanical analysis and the moisture equivalent. He concludes that there is at present no formula that gives more than a rough approximation of this relationship, and hence that the moisture equivalent cannot be indirectly determined by mechanical analysis with any degree of accuracy.—GEO. D. FULLER.

Soil aeration and root growth.—Roots of various plants appear, according to the results of CANNON and FREE,[30] to respond quite differently to variations in the composition of the soil atmosphere, and this difference in response seems

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[27] SMALL, JAMES, Geotropism and the Weber-Fechner law. Ann. Botany **31**:313–314. 1917.

[28] SHARP, L. T., and WAYNICK, D. D., The moisture equivalent determinations of salt-treated soils and their relation to changes in the interior surfaces. Soil Sci. **4**:463–469. 1917.

[29] SMITH, ALFRED, Relation of the mechanical analysis to the moisture equivalent of soils. Soil Sci. **4**:471–476. 1917.

[30] CANNON, W. A., and FREE, E. E., The ecological significance of soil aeration. Science, N.S. **45**:178–180. 1917.